

What is Claimed is:

1. An optical module comprising:

a carrier on which an optical element is mounted, said carrier being formed of a semiconductor material where a first high-frequency transmission line for transmitting a high-frequency electric signal to the optical element is formed; and

a dielectric substrate where a second high-frequency transmission line for supplying a high-frequency electric signal to the first high-frequency transmission line of the carrier is formed;

wherein:

an electrical connection is made between the first high-frequency transmission line and the second high-frequency transmission line by use of a conductor wire;

said first high-frequency transmission line is formed of a coplanar waveguide; and

said second high-frequency transmission line is formed by coupling a first coplanar waveguide, which is formed on an input side by providing a ground layer under the transmission line across a dielectric, to a second coplanar waveguide formed on an output side with a distance between a signal wiring conductor of the transmission line and the ground layer made longer as compared with the first coplanar waveguide or formed on the output side without

providing the ground layer.

2. An optical module according to Claim 1, wherein:
the carrier and the dielectric substrate are placed
on and secured to a base member.

3. An optical module comprising:
a carrier on which an optical element is mounted,
said carrier being formed of a semiconductor material where
a first high-frequency transmission line for transmitting a
high-frequency electric signal to the optical element is
formed; and

a dielectric substrate where a second high-frequency
transmission line for supplying a high-frequency electric
signal to the first high-frequency transmission line of the
carrier is formed;

wherein:

an electrical connection is made between the first
high-frequency transmission line and the second high-
frequency transmission line by use of a conductor wire and
a third high-frequency transmission line;

said first high-frequency transmission line and said
third high-frequency transmission line are formed of
coplanar waveguides; and

said second high-frequency transmission line is
formed by coupling a first coplanar waveguide, which is

formed on an input side by providing a ground layer under the transmission line across a dielectric, to a second coplanar waveguide formed on an output side with a distance between a signal wiring conductor of the transmission line and the ground layer made longer as compared with the first coplanar waveguide or formed on the output side without providing the ground layer.

4. An optical module according to Claim 3, wherein:
said dielectric substrate is formed as a package substrate, and said second high-frequency transmission line is formed on the package substrate.

5. An optical module according to Claim 1, wherein:
in the first coplanar waveguide of the second high-frequency transmission line, an electrical connection is made between the ground layer under the transmission line and the ground wiring conductor of the transmission line by use of a via hole.

6. An optical module according to Claim 3, wherein:
in the first coplanar waveguide of the second high-frequency transmission line, an electrical connection is made between the ground layer under the transmission line and the ground wiring conductor of the transmission line by use of a via hole.

7. An optical module according to Claim 1, wherein:
in the second high-frequency transmission line, a conversion line for smoothly changing a transmission mode is provided between the first coplanar waveguide and the second coplanar waveguide.

8. An optical module according to Claim 3, wherein:
in the second high-frequency transmission line, a conversion line for smoothly changing a transmission mode is provided between the first coplanar waveguide and the second coplanar waveguide.

9. An optical module comprising:
a carrier on which an optical element is mounted, said carrier being formed of a semiconductor material where a fourth high-frequency transmission line for transmitting a high-frequency electric signal to the optical element is formed; and

a dielectric substrate where a fifth high-frequency transmission line for supplying a high-frequency electric signal to the fourth high-frequency transmission line of the carrier is formed;

wherein:

an electrical connection is made between the fourth high-frequency transmission line and the fifth high-frequency transmission line by use of a conductor wire;

said fourth high-frequency transmission line is formed of a coplanar strip waveguide; and

said fifth high-frequency transmission line is made up of the coplanar waveguide formed on an input side, the coplanar strip waveguide formed on an output side, and a conversion transmission line used for connecting the waveguides.

10. An optical module according to Claim 9, wherein:
ground wiring in the coplanar strip waveguide of the fourth high-frequency transmission line is formed by using a conductor wire to make an electrical connection to a base member to which the carrier is secured.

11. An optical module according to Claim 9, wherein:
in the fifth high-frequency transmission line, a ground layer is provided under the transmission line across a dielectric, and an electrical connection between the ground layer and the ground wiring conductor is made by use of a via hole.

12. An optical module according to Claim 10,
wherein:

in the fifth high-frequency transmission line, a ground layer is provided under the transmission line across a dielectric, and an electrical connection between the

ground layer and the ground wiring conductor is made by use of a via hole.

13. An optical module wherein:

a carrier on which an optical element is mounted is secured to a base member, said carrier being formed of a semiconductor material where a fourth high-frequency transmission line for transmitting a high-frequency electric signal to the optical element is formed, said fourth high-frequency transmission line being formed of a coplanar strip waveguide; and

ground wiring in the coplanar strip waveguide is electrically connected to a metal part in the base member by use of a conductor wire.

14. An optical module according to Claim 1, 3, 9 or 13, wherein:

a main constituent of a semiconductor material of the carrier is one of Si, GaAs, and InP.

15. An optical module according to Claim 1, 3, 9 or 13, wherein:

said optical element is an optical modulator element or a semiconductor laser integrated with an optical modulator.

16. An optical module comprising:

a first substrate on which an optical element is mounted, said first substrate being formed of a semiconductor substrate where a first high-frequency transmission line for transmitting a high-frequency electric signal to the optical element is formed; and

a second substrate formed of a dielectric substrate where a second high-frequency transmission line for supplying a high-frequency electric signal to the first high-frequency transmission line of the first substrate is formed;

wherein:

said first high-frequency transmission line is formed of a surface coplanar waveguide; and

said second high-frequency transmission line is formed by coupling a grounded coplanar waveguide formed on an input side to the surface coplanar waveguide formed on an output side.

17. An optical transmission apparatus comprising:

an optical module according to Claim 1, 3, 9, 13 or 16; and

a multiplexing IC that multiplexes an inputted parallel signal and then inputs the multiplexed signal into the optical element of the optical module.